

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

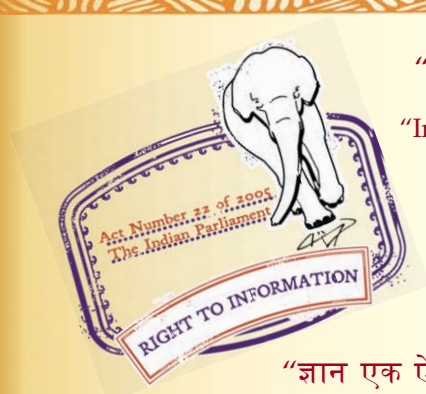
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1448-110 (1981): Methods of test for petroleum and its products, Part 110: Cold filter plugging point of distillate fuels [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE





IS : 1448 [P : 110] - 1981

Adopted : 28 December 1981

(Reaffirmed 2003)

Indian Standard

METHODS OF TEST FOR PETROLEUM AND ITS PRODUCTS

[P : 110]

COLD FILTER PLUGGING POINT OF DISTILLATE FUELS

UDC 665.6/7 : 662.753.323 : 536.421.4

*Adapted, with permission from the Institute of Petroleum Method
Designation IP 309/80*

1. SCOPE

1.1 This method describes a procedure for the determination of the low temperature operability of distillate fuels (automotive diesel fuels and gas oils), including those containing a flow improving additive.

1.2 This test may not be applicable to the determination of the low temperature operability of distillate fuels used in equipment with exposed paper filters in the fuel supply system.

2. OUTLINE OF THE METHOD

2.1 The fuel sample is cooled under the prescribed conditions and, at intervals of 1°C, a vacuum of 200 mm water gauge is applied to draw the fuel through a fine wire mesh filter. As the fuel cools below its cloud point, increasing amounts of wax crystals will be formed. These will cause the flow rate to decrease and eventually complete plugging of the filter will occur.

3. TERMINOLOGY

3.1 The Cold Filter Plugging Point — It is defined as the highest temperature (expressed as a multiple of 1°C) at which the fuel, when cooled under the prescribed conditions, either will not flow through the filter or requires more than 60 seconds for 20 ml to pass through.

4. APPARATUS

4.0 The apparatus required for this test is illustrated in Fig. 1 and 2 and consist of the following.

© Copyright 1982

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

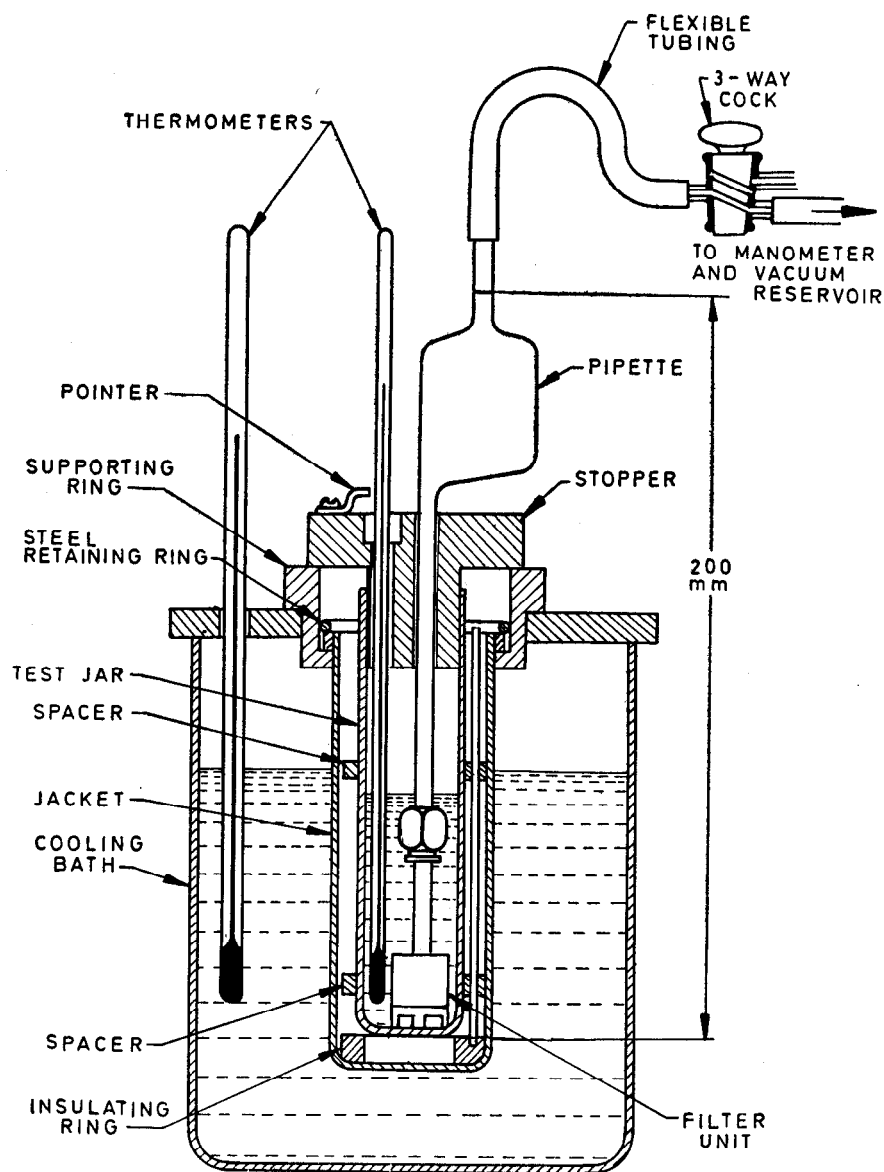


FIG. 1 GENERAL ARRANGEMENTS OF APPARATUS — *Contd*

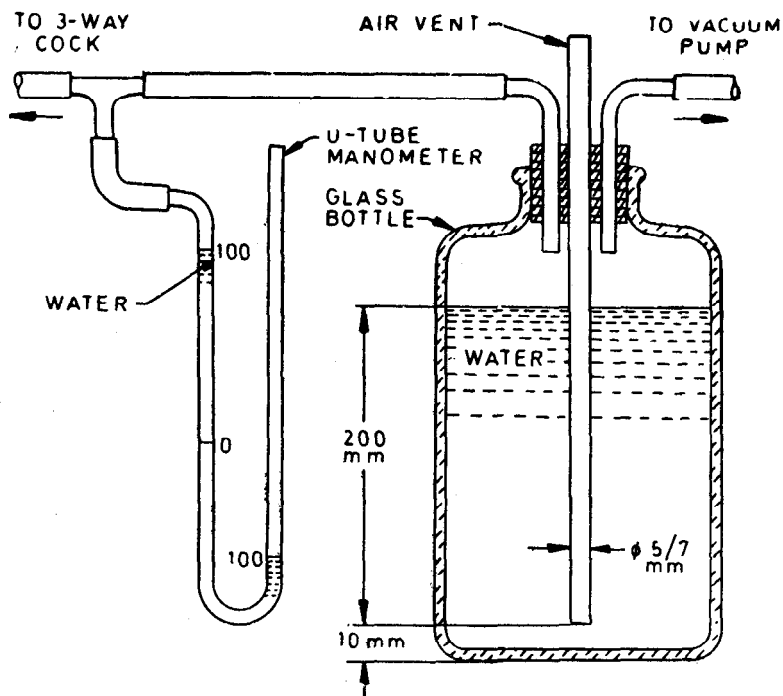


FIG. 1 GENERAL ARRANGEMENTS OF APPARATUS

4.1 Test Jar — A cylindrical test jar of clear glass, flat bottom, with internal diameter 31.0 to 32.0 mm, a wall thickness of 1.0 to 1.5 mm, and a height of 115 to 125 mm. The jar shall have an etched mark at the 45 ml level.

4.2 Jacket — A water-tight cylindrical jacket of brass, flat bottom, with the dimensions given in Fig. 2.

4.3 Supporting Ring — An adaptor of oil resistant plastic is required to position the jar and the jacket respectively in relation to the jacket and the cooling bath. A suitable form is shown in Fig. 2. This design may, however, be modified to suit existing cooling baths.

4.4 Insulating Ring and Spacer (see Fig. 2) — Made from oil resistant plastic and used to insulate the test jar from the bottom and sides of the jacket. The spacer shall fit closely to the test jar and loosely inside the jacket.

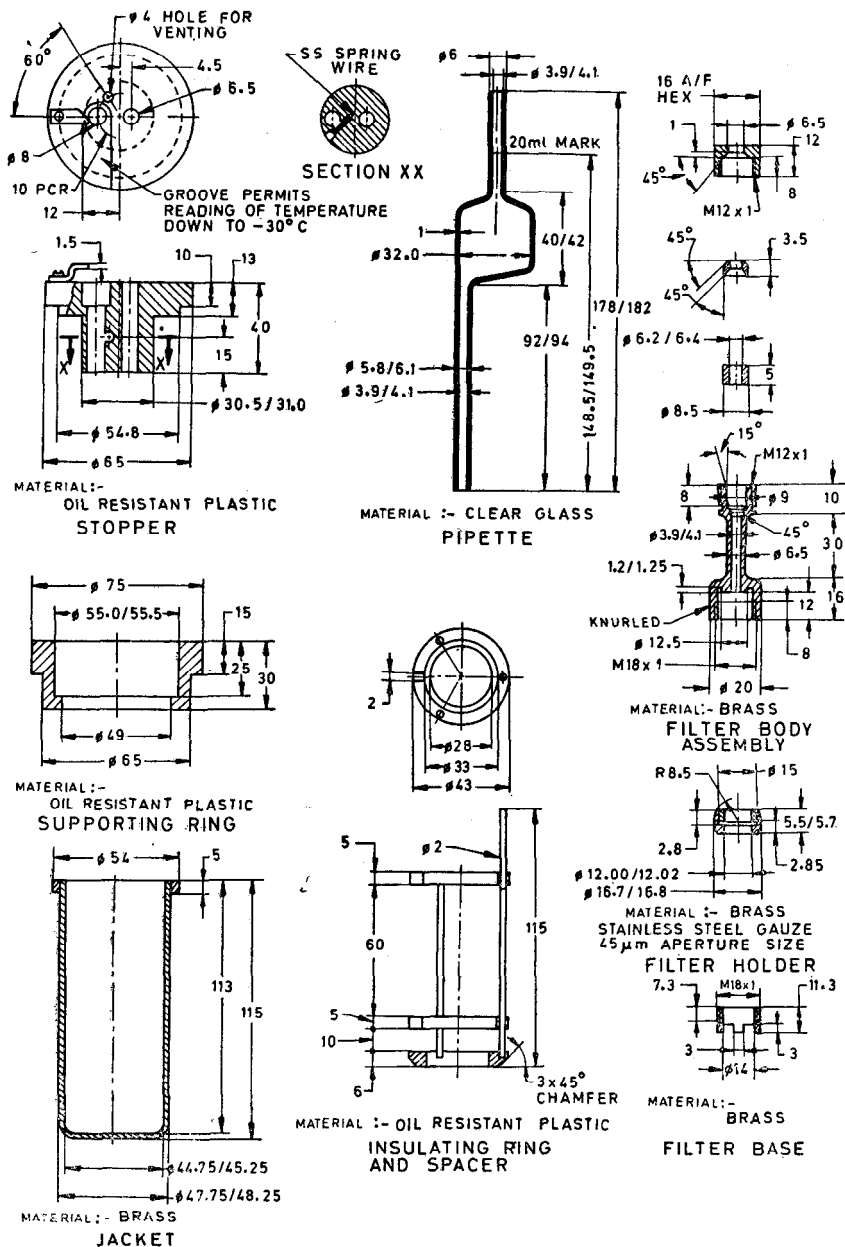


FIG. 2 DETAILS OF APPARATUS

4.5 Stopper — To fit the test jar and as shown in Fig. 2. The three holes accommodate the thermometer (*see* 4.6), the pipette (*see* 4.7) and allow venting of the system.

4.6 Thermometer* — Conforming to the following requirements:

Range	—38°C to +50°C
Graduation	1°C
Immersion	108 mm
Overall length	225 to 235 mm
Stem diameter	6.0 to 8.0 mm
Bulb length	7 to 10 mm
Bulb diameter	5.5 <i>Min</i> , but not greater than stem
Length of graduated portion	65 to 85 mm
Distance between bottom of bulb and — 38°C	120 to 130 mm
Longer lines at each	5°C
Figured at each	10°C
Maximum line width	0.15 mm
Scale error, <i>Max</i>	0.5°C
Expansion chamber: Permit heating to	100°C

4.6.1 A pointer and spring wire clip are used to position the thermometer correctly and maintain it in that position.

4.7 Pipette with Filter Unit — The pipette made from clear glass is connected to the filter unit (*see* Fig. 2) using a screwed cap with O-rings and brass spacers.

4.7.1 The wire mesh holder for the test gauze is shown in Fig. 2. The fine wire mesh has a nominal aperture width of 45 micrometres. The mesh is firmly clamped in position by a retaining ring which is pressed on to the mesh holder.

4.7.2 The filter unit is made from brass and the mesh from stainless steel. The O-ring material is oil resistant plastic.

*Thermometer with the Institute of Petroleum designation IP 1C conforms to these requirements. Thermometers with designation IP 2C may also be used.

4.8 Cooling Bath — The type of cooling bath is optional, but shall be of a shape and size suitable for supporting the jacket at the required depth. Maintain the bath temperature at the required value by a refrigeration unit or by the use of suitable freezing mixtures. A cooling bath as used in IS : 1448 (P : 10)-1970* may be suitable. For determinations of cold filter plugging points below -20°C a second (and possibly a third) bath will be required. If several testing units are placed in one large cooling bath the distance between the jacket walls shall be at least 50 mm.

4.9 Vacuum Source — A large glass bottle, partly filled with water and connected to a vacuum pump, acts as constant vacuum reservoir. The constant vacuum is maintained at 200 mm water gauge by ensuring a continuous air bleed of 3 to 4 litres/h into the reservoir. This is illustrated in Fig. 1 which shows the layout of the test apparatus.

4.10 Stop Watch — Graduated to 0.2 seconds.

NOTE — Automatic testers are available. In these, the sample temperature measurement and change in cooling bath temperature are by different means to those described for the manual method. The manual method shall be used for any referee purposes.

5. PREPARATION OF SAMPLE

5.1 Filter the sample to be tested through dry lintless filter paper, making the filtration at a temperature of 15°C or higher.

6. PREPARATION OF FILTER

6.1 Before each test, dismantle the filter unit and wash the pieces as well as the test jar and thermometer with a low boiling solvent such as 60/80 petroleum ether or 1,1,1-trichloroethane, using the vacuum to suck solvent into the pipette above the etched mark. Rinse with acetone and dry in an air stream.

6.2 Examine the wire mesh and O-rings for contamination or damage and, if necessary, renew. Assemble the parts as shown in Fig. 1. Ensure that the assembly is clean and dry before inserting into the next jar of test fuel.

7. PROCEDURE

7.1 Dry the insulating ring and spacer and place on the bottom of the previously dried jacket.

7.2 Pour the filtered sample into the test jar to the etched mark (45 ml). Wipe the test jar to ensure that the outside is clean and dry.

*Methods of test for petroleum and its products: P 10 Cloud point and pour point.

7.3 Close the test jar with the stopper carrying the pipette, filter unit and thermometer. Ensure that the bulb of the thermometer is not in contact with the side of the test jar of the filter body. Only use a low range thermometer if the expected cold filter plugging point is below -30°C . Thermometers shall not be changed during the test.

7.4 Insert the test jar assembly in a vertical position into the jacket. The filter unit rests on the bottom of the test jar and the thermometer is positioned by the use of the pointer and spring wire clip so that its lower end is 1.3 to 1.7 mm above the bottom of the test jar.

7.5 If the jacket is not an integral part of the cooling bath, place the jacket containing the test jar assembly vertically to a depth of 83 to 87 mm into the cooling bath which is maintained at a temperature of $-34 \pm 0.5^{\circ}\text{C}$.

7.6 Connect the top of the pipette to the vacuum system by means of flexible tubing. Testing may be commenced immediately but if the cloud point of the sample is known it may be preferable to delay testing until the sample has cooled to a temperature of not less than 5°C above its cloud point. However, testing shall start while the sample is still in the $-34 \pm 0.5^{\circ}\text{C}$ bath.

7.7 If the sample reaches a temperature of -20°C before the cold filter plugging point is reached, quickly transfer the test jar to a jacket in a cooling bath maintained at $-51 \pm 0.5^{\circ}\text{C}$. If the sample has not reached its cold filter plugging point when its temperature reaches -35°C quickly transfer the test jar to a jacket in a bath maintained at $-67 \pm 2^{\circ}\text{C}$.

7.8 Commence testing at a sample temperature which is a multiple of 1°C by turning the three-way tap so that the filter assembly is connected to the vacuum system, causing the sample to be drawn through the fine wire mesh into the pipette. Once the sample has reached the etched mark on the pipette, turn the three-way tap to its initial position to vent the pipette and so allow the sample to return to the test jar.

7.9 Repeat the operation described in 7.8 at 1°C intervals until the temperature is reached at which either the sample ceases to flow through the filter or the pipette is not filled to the etched mark within 60 seconds. Record the temperature at which this last filtration commenced.

NOTE — Occasionally, when a sample has cooled almost to its cold filter plugging point, it will fill the pipette to the etched mark when tested but will not flow back into the test jar when the pipette is vented. If this happens, the sample shall be considered to have plugged the filter and the temperature shall be recorded as above.

8. REPORT

8.1 Report the temperature recorded in 7.9 as the Cold Filter Plugging Point.

9. PRECISION

9.0 The precision of this method (in either automatic or manual apparatus) is as foollows:

$$\begin{array}{c} \text{Repeatability} \\ 0.033 (30 - x) \end{array}$$

$$\begin{array}{c} \text{Reproducibility} \\ 0.092 (30 - x) \end{array}$$

where x is the average of the two results. Precision values for typical values of x are given below:

<i>Result</i> $x^{\circ}\text{C}$	<i>Repeatability</i> $^{\circ}\text{C}$	<i>Result</i> $x^{\circ}\text{C}$	<i>Reproducibility</i> $^{\circ}\text{C}$
0 to -3	1	0 to -3	3
-4 to -33	2	-4 to -14	4
-33 to -35	3	-15 to -25	5
		-26 to -35	6